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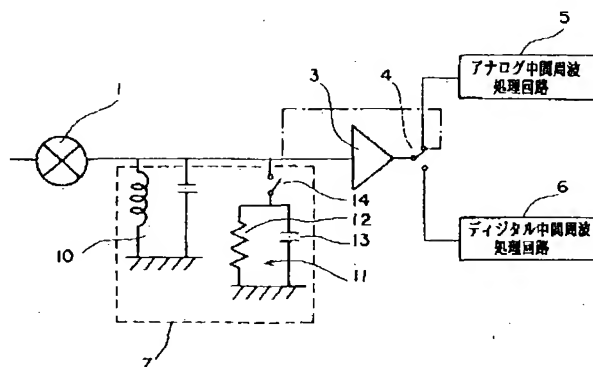
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(54) 【発明の名称】 テレビジョンチューナ

(57) 【要約】

【課題】 アナログ信号のレベルを下げることなく、デジタル信号受信時の、隣接アナログチャンネルからの妨害を受けにくくする。

【解決手段】 中間周波同調回路にダンパ回路11を設け、その開閉スイッチ14をアナログ、デジタル切替スイッチ4と連動させる。ダンパの開閉によって、中間周波同調回路2のQ及びピーク周波数を、アナログ信号、デジタル信号、それぞれの受信に最適な値に切替える。



## 【特許請求の範囲】

【請求項1】 受信したアナログテレビジョン信号又はデジタルテレビジョン信号を中間周波信号に変換する混合器と、前記混合器の後段に設けられた中間周波増幅器とを備え、前記混合器と前記中間周波増幅器との間に、前記中間周波信号を通過させる同調回路を設け、デジタルテレビジョン信号受信時は、アナログテレビジョン信号受信時よりも前記同調回路のQを小さくしたことを特徴とするテレビジョンチューナ。

【請求項2】 前記同調回路は並列共振回路とダンパー回路とからなり、前記ダンパ回路を前記並列共振回路に接離させてQを切り替えることを特徴とする請求項1記載のテレビジョンチューナ。

【請求項3】 前記ダンパ回路が抵抗とコンデンサとの並列回路からなることを特徴とする請求項2記載のテレビジョンチューナ。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、アナログテレビジョン信号またはデジタルテレビジョン信号を受信可能なテレビジョンチューナに関し、特にデジタルテレビジョン信号受信時に、隣接チャンネルのアナログテレビジョン信号からの妨害を受けにくくしたチューナに関するものである。

## 【0002】

【従来の技術】図4に、従来のテレビジョンチューナの中間周波回路部の構成を示す。受信したアナログテレビジョン信号（以下アナログ信号と称する）またはデジタルテレビジョン信号（以下デジタル信号と称する）を周波数変換するミキサ1から出された中間周波信号は、中間周波同調回路2を経て中間周波増幅器3に送られ、その後アナログ、デジタル切替スイッチ4により、それぞれの中間周波処理回路5、6に送られる。

## 【0003】

【発明が解決しようとする課題】ところで、最近いわゆる地上波を用いたデジタルテレビジョン放送が試験的に開始されようとしている。デジタルテレビジョン放送は、従来のアナログ方式のテレビジョン放送で割り当てられているチャンネル以外の、いわゆる空きチャンネルを用いて行われる。そのため、現在は、デジタル信号を送るチャンネルとアナログ信号を送るチャンネルとが混在した状態で配列されている。図5に、9チャンネルをデジタル信号に割り当てた場合の、8チャンネル乃至10チャンネルまでの周波数帯域図を示す。

【0004】図5に見られるように、一般的にデジタル信号はアナログ信号のレベルよりも10乃至35dB程度低いレベルで送信されている。これは、隣接チャンネルにデジタル信号が存在する状態で従来のアナログ信号を受信する場合に、デジタル信号によるアナログ信号への妨害を防ぐことを目的としている。

【0005】逆に、隣接チャンネルにアナログ信号が存在する状態でデジタル信号を受信する場合、中間周波増幅器3の3次の歪みによって、隣接チャンネルのアナログ信号によるビート等の妨害信号が、中間周波信号の帯域に発生する。この場合、前述の理由でデジタル信号のレベルが低いだけに、帯域内に発生した歪みによる妨害の程度は相対的に大きなものとなる。

【0006】対策の一つとして、中間周波増幅器3の入力のレベルを下げるという手段があるが、その結果本来レベルを下げる必要のないアナログ信号のレベルを下げることになり、アナログ信号受信時には、S/N比が低下する、あるいは出力レベルが不足する、という問題点があった。

【0007】本発明の目的は、前記の問題点を解消し、隣接チャンネルにアナログ信号が存在する状態でデジタル信号を受信する場合に、アナログ信号のレベルを下げることなく、該アナログ信号からの妨害を受けにくくした、テレビジョンチューナを提供することにある。

## 【0008】

【課題を解決するための手段】上記の課題を解決するため、本発明のテレビジョンチューナは、受信したアナログテレビジョン信号又はデジタルテレビジョン信号を中間周波信号に変換する混合器と、前記混合器の後段に設けられた中間周波増幅器とを備え、前記混合器と前記中間周波増幅器との間に、前記中間周波信号を通過させる同調回路を設け、デジタルテレビジョン信号受信時は、アナログテレビジョン信号受信時よりも前記同調回路のQを小さくしたことを特徴とするテレビジョンチューナである。

【0009】また本発明のテレビジョンチューナは、前記同調回路は並列共振回路とダンパー回路とからなり、前記ダンパ回路を前記並列共振回路に接離させてQを切り替えることを特徴とする請求項1記載のテレビジョンチューナある。

【0010】また本発明のテレビジョンチューナは、前記ダンパ回路が抵抗とコンデンサとの並列回路からなることを特徴とする請求項2記載のテレビジョンチューナである。

## 【0011】

【発明の実施の形態】以下、本発明のテレビジョンチューナを図1乃至図3に従って説明する。図1は、本発明の実施形態における、中間周波回路の構成を示している。図4の従来例と比較すると、同調回路7が並列共振回路10とダンパ回路11で構成されていることが本発明の特徴を示す相違点であり、他のミキサ1、増幅器3、アナログ、デジタル切替スイッチ4は従来例と同一である。ダンパ回路11は並列接続された抵抗12とコンデンサ13からなり、スイッチ14によって並列共振回路10に並列に接離可能とされる。

【0012】前記のスイッチ14は、アナログ、ディジ

タル切替スイッチ4と連動している。即ち、アナログ信号受信時はダンパ回路11のスイッチ14は開放されて並列共振回路10と切り離されており、切替スイッチ4はアナログ側となっている。デジタル信号受信時は、スイッチ14を閉としてダンパ回路11を並列共振回路10に並列に接続すると同時に、切替スイッチ4はデジタル側に切り替えられる。

【0013】図2は、アナログ信号受信モードとしたときの、中間周波回路としての伝送特性を示す。並列共振回路10は高いQを有しており、映像中間周波信号Pと音声中間周波信号Sとの中間よりもややPよりにピークを持つ、先鋭度の高い特性を示す。図2の波形はアナログ信号の受信に適した波形であり、充分な出力と好適なSN比を得ることができる。

【0014】一方デジタル信号の受信では、広い帯域でできるだけフラットな伝送特性が要求される。図3は、ダンパ回路11を並列共振回路10に接続してデジタル信号受信モードとしたときの、中間周波回路の伝送特性を示す。ダンパ回路11内の抵抗12の作用で、同調回路7としてのQは減少する。この結果、ピークのレベルBはアナログ信号受信時のピークレベルAと比較して5乃至15dB下がるとともに中間周波帯域内のレベル偏差Cが小さくなる。

【0015】また本発明を例えばヨーロッパチャンネルに適用する場合、ダンパ回路11内のコンデンサ13の作用により、同調特性のピーク点の周波数 $f_0$ が中間周波帯域のほぼ中心である36.15MHzとなるように設定している。これらの抵抗12及びコンデンサ13、両者の働きにより、伝送特性は、中間周波帯域のほぼ中心にピークを有し、且つ左右対称でフラットに近くなり、デジタル信号の受信に好適な波形となる。

【0016】本発明を例えばヨーロッパチャンネルに適用する場合、前記抵抗12の抵抗値は、30乃至1k

〔Ω〕の範囲が好ましく、また前記コンデンサ13の容量は50p〔F〕以下が好ましい。

【0017】

【発明の効果】以上説明したように、本発明のテレビジョンチューナは、中間周波同調回路のQとピーク周波数の位置を、ダンパ回路の開閉により切り替えるものである。デジタル信号受信時には、アナログ信号受信時よりもQを小さくし、またピーク周波数の位置もそれぞれの信号受信に適した値とすることにより、アナログ信号のレベルを落とさずに、デジタル信号受信時の、隣接アナログチャンネルからの妨害を受けにくくすることができる。

【図面の簡単な説明】

【図1】本発明のテレビジョンチューナの中間周波回路構成図である。

【図2】本発明のテレビジョンチューナのアナログ信号伝送特性図である。

【図3】本発明のテレビジョンチューナのデジタル信号伝送特性図である。

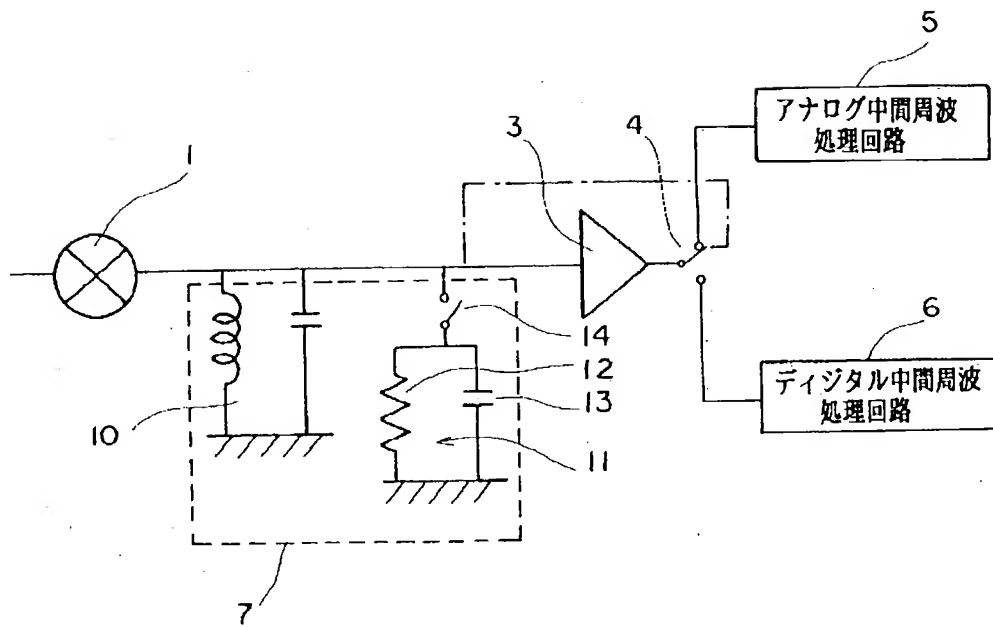
【図4】従来例のテレビジョンチューナの中間周波回路構成図である。

【図5】周波数帯域図である。

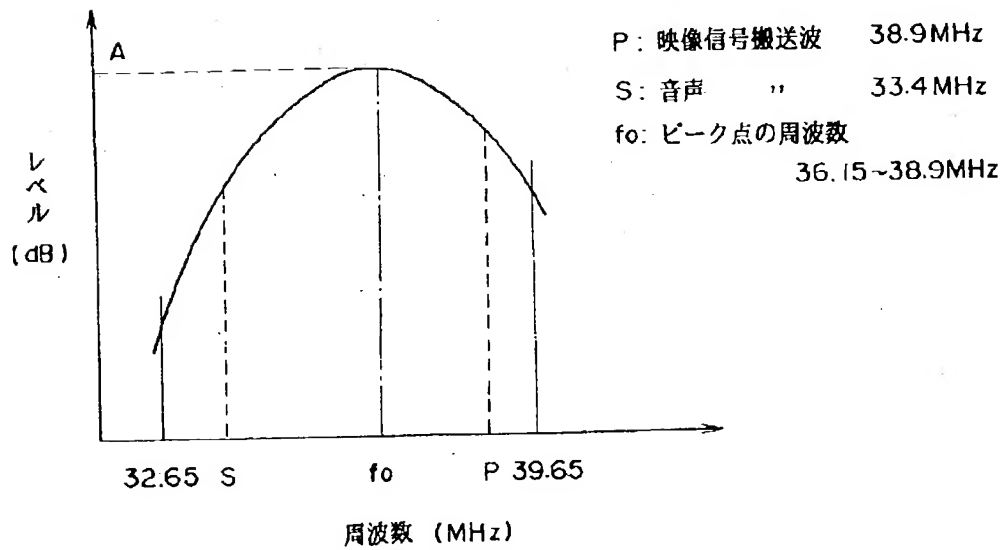
【符号の説明】

- 1 ミキサ
- 2 中間周波同調回路
- 3 中間周波増幅器
- 4 アナログ、デジタル切り替えスイッチ
- 10 並列共振回路
- 11 ダンパ回路
- 12 抵抗
- 13 コンデンサ
- 14 ダンパ回路スイッチ

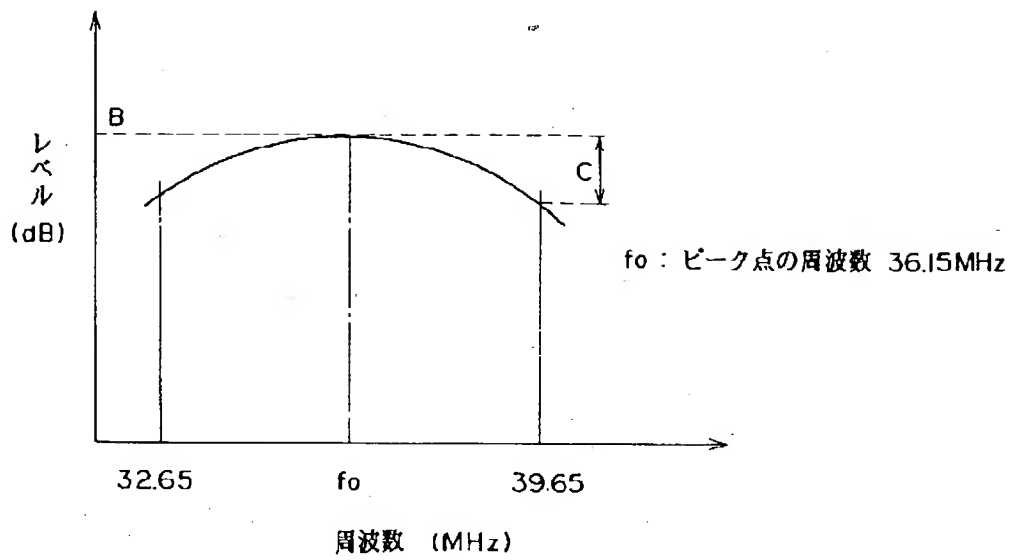
【図1】



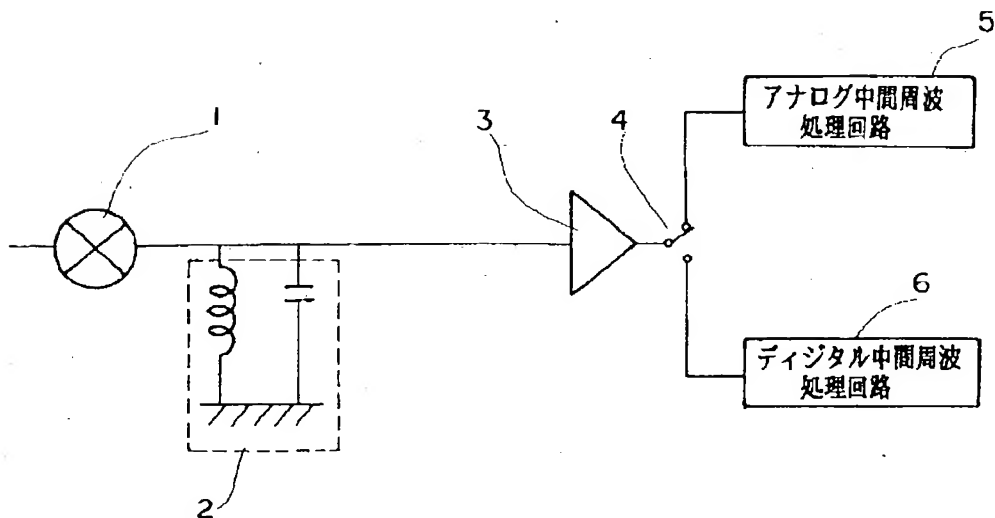
【図2】



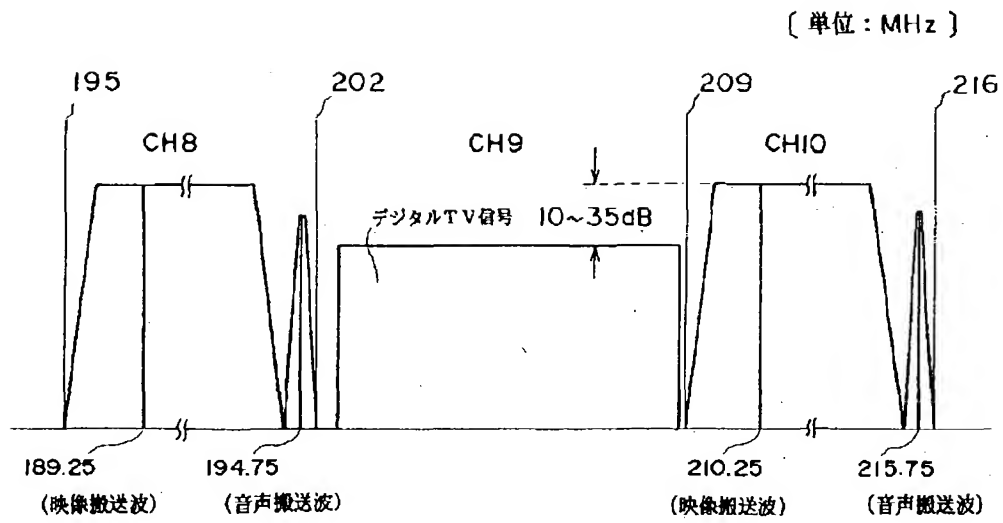
【図3】



【図4】



【図5】



## PATENT ABSTRACTS OF JAPAN

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(71)Applicant : ALPS ELECTRIC CO LTD

(22)Date of filing : 07.06.1999

(72)Inventor : OGASAWARA YUTAKA

## (54) TELEVISION TUNER

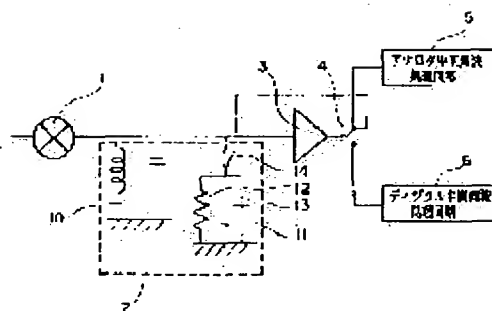
## (57)Abstract:

PROBLEM TO BE SOLVED: To suppress disturbance from an analog signal by decreasing the Q of a tuning circuit that is placed between a mixer and an intermediate frequency amplifier and passes an intermediate frequency signal when receiving a digital television signal more than that of the tuning circuit in the case of receiving an analog television signal.

SOLUTION: A damper circuit 11 consists of a resistor 12 and a capacitor 13 connected in parallel and is connected in parallel with a parallel resonance circuit 10 with a damper circuit switch 14. The switch 14 is interlocked with an analog/digital changeover switch 4.

The switch 14 of the damper circuit 11 is opened and separated from the circuit 10 in the case of receiving an analog signal, and the changeover switch 4 is thrown to the position of an analog signal circuit. The switch 14 is closed in the case of receiving a digital signal to connect the damper circuit 11 in parallel with the parallel resonance circuit 10 and the changeover switch 4 is

thrown to the position of a digital signal circuit. Disturbance can be suppressed by changing the Q of the intermediate frequency tuning circuit and position of a peak frequency.



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**CLAIMS**

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[Claim(s)]

[Claim 1] It is the television tuner which is equipped with the mixer which changes the received analog television signal or a digital television signal into an intermediate frequency signal, and the intermediate frequency amplifier prepared in the latter part of the aforementioned mixer, prepares the tuning circuit which passes the aforementioned intermediate frequency signal between the aforementioned mixer and the aforementioned intermediate frequency amplifier, and is characterized by making Q of the aforementioned tuning circuit smaller than the time of analog television signal reception at the time of digital television signal reception.

[Claim 2] The aforementioned tuning circuit is a television tuner according to claim 1 characterized by consisting of a parallel resonant circuit and a damper circuit, making the aforementioned damper circuit attach and detach to the aforementioned parallel resonant circuit, and changing Q.

[Claim 3] The television tuner according to claim 2 to which the aforementioned damper circuit is characterized by the bird clapper from the parallel circuit of resistance and a capacitor.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the tuner which made disturbance from the analog television signal of a contiguity channel hard to receive at the time of digital television signal reception especially about the television tuner which can receive an analog television signal or a digital television signal.

[0002]

[Description of the Prior Art] The composition of the intermediate frequency circuit section of the conventional television tuner is shown in drawing 4. The intermediate frequency signal taken out from the mixer 1 which carries out frequency conversion of the received analog television signal (an analog signal is called below) or the digital television signal (a digital signal is called below) is sent to the intermediate frequency amplifier 3 through the intermediate frequency tuning circuit 2, and is sent to each intermediate frequency processing circuit 5 and 6 with an analog and the digital circuit changing switch 4 after that.

[0003]

[Problem(s) to be Solved by the Invention] By the way, the digital television broadcast using the so-called ground wave is going to be started in a tentative way recently. Digital television broadcast is performed using the so-called unassigned channels other than the channel currently assigned by the television broadcasting of the conventional analog method. Therefore, it is arranged where the channel which sends a digital signal, and the channel which sends an analog signal are intermingled now. The frequency band view to 8 at the time of assigning nine channels to drawing 5 at a digital signal or ten channels is shown.

[0004] Generally the digital signal is transmitted on 10 or about [ 35dB ] low level rather than the level of an analog signal so that drawing 5 may see. This aims at preventing the disturbance to the analog signal by the digital signal, when receiving the analog signal conventional in the state where a digital signal exists in a contiguity channel.

[0005] On the contrary, when receiving a digital signal in the state where an analog signal exists in a contiguity channel, disturbance signals, such as a beat by the analog signal of a contiguity channel, occur in the band of an intermediate frequency signal by 3rd distortion of the intermediate frequency amplifier 3. In this case, the grade of disturbance by distortion which the level of a digital signal generated in the band only in the low will become big relatively by the above-mentioned reason.

[0006] Although there was a means to lower the level of the input of the intermediate frequency amplifier 3 as one of the cures, the level of an analog signal without the need of as a result lowering level originally will be lowered, at the time of analog signal reception, the SN ratio fell or there was a trouble that output levels ran short.

[0007] The purpose of this invention cancels the aforementioned trouble, and it is to offer the television tuner which made disturbance from this analog signal hard to receive, without lowering the level of an analog signal, when receiving a digital signal in the state where an analog signal exists in a contiguity channel.

[0008]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the television tuner of this invention is equipped with the mixer which changes the received analog television signal or a digital television signal into an intermediate frequency signal, and the intermediate frequency amplifier prepared in the latter part of the aforementioned mixer, and prepares the tuning circuit which passes the aforementioned intermediate frequency signal between the aforementioned mixer and the aforementioned intermediate frequency amplifier, and it is the television tuner characterized by to make Q of the aforementioned tuning circuit smaller than the time of analog television signal reception at the time of digital television signal reception.

[0009] Moreover, television tuner of this invention The aforementioned tuning circuit is television tuner \*\*\*\* according to claim 1 characterized by consisting of a parallel resonant circuit and a damper circuit, making the aforementioned damper circuit attach and detach to the aforementioned parallel resonant circuit, and changing Q.

[0010] Moreover, television tuner of this invention The aforementioned damper circuit is the television tuner according to claim 2 characterized by the bird clapper from the parallel circuit of resistance and a capacitor.

[0011]

[Embodiments of the Invention] Hereafter, the television tuner of this invention is explained according to drawing 1 or drawing 3. Drawing 1 shows the composition of the intermediate frequency circuit in the operation gestalt of this invention. That the tuning circuit 7 consists of a parallel resonant circuit 10 and a damper circuit 11 as compared with the conventional example of drawing 4 is the difference which shows the feature of this invention, and other mixers 1, amplifier 3, the analog, and the digital circuit changing switch 4 are the same as that of the conventional example. The damper circuit 11 consists of the resistance 12 and the capacitor 13 by which parallel connection was carried out, and attachment and detachment of it is enabled in parallel by the switch 14 at a parallel resonant circuit 10.

[0012] The aforementioned switch 14 is being interlocked with the analog and the digital circuit changing switch 4. That is, the switch 14 of the damper circuit 11 is wide opened at the time of analog signal reception, it is separated from the parallel resonant circuit 10, and the circuit changing switch 4 has become the analog side. A circuit changing switch 4 is changed to a digital side at the same time it connects the damper circuit 11 in parallel with a parallel resonant circuit 10, using a switch 14 as close at the time of digital signal reception.

[0013] Drawing 2 shows the transmission characteristic as an intermediate frequency circuit when considering as the analog signal receive mode. the parallel resonant circuit 10 has high Q, and shows the property which is alike from mist or P and has a peak from the middle of the image intermediate frequency signal P and the voice intermediate frequency signal S that the degree of acute is high The wave of drawing 2 is a wave suitable for reception of an analog signal, and can obtain sufficient output and a suitable SN ratio.

[0014] On the other hand by reception of a digital signal, the flat possible transmission characteristic is required by the wide band. Drawing 3 shows the transmission characteristic of an intermediate frequency circuit when connecting the damper circuit 11 to a parallel resonant circuit 10, and considering as the digital signal receive mode. Q as a tuning circuit 7 decreases in an operation of the resistance 12 in the damper circuit 11. consequently, the level B of a peak — the peak level A at the time of analog signal reception — comparing — 5 — or while falling by 15dB, the level deflection C in an intermediate frequency band becomes small

[0015] Moreover, by operation of the capacitor 13 in the damper circuit 11, when applying this invention to for example, the Europe channel, it has set up so that the frequency  $f_0$  of the peak point of an alignment property may be set to 36.15MHz of an intermediate frequency band which is a center mostly. By work of these resistance 12 and a capacitor 13, and both, it has a peak at the center mostly, and an intermediate frequency band becomes close to a flat by the bilateral symmetry, and a transmission characteristic serves as a suitable wave for reception of a digital signal.

[0016] When applying this invention to for example, the Europe channel, the resistance of the aforementioned resistance 12 has the desirable range of 30 or 1k [ $\Omega$ ], and below 50p [F] of

the capacity of the aforementioned capacitor 13 is desirable.

[0017]

[Effect of the Invention] As explained above, the television tuner of this invention changes  $Q$  of an intermediate frequency tuning circuit, and the position of peak frequency by opening and closing of a damper circuit. Disturbance from a contiguity analog channel at the time of digital signal reception can be made hard to receive without dropping the level of an analog signal by considering as the value to which  $Q$  was made smaller than the time of analog signal reception, and the position of peak frequency was also suitable for each signal reception at the time of digital signal reception.

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**DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1] It is the intermediate frequency circuitry view of the television tuner of this invention.

[Drawing 2] It is the analog signal transmission characteristic view of the television tuner of this invention.

[Drawing 3] It is the digital signal transmission characteristic view of the television tuner of this invention.

[Drawing 4] It is the intermediate frequency circuitry view of the television tuner of the conventional example.

[Drawing 5] It is a frequency band view.

[Description of Notations]

1 Mixer

2 Intermediate Frequency Tuning Circuit

3 Intermediate Frequency Amplifier

4 Analog, Digital Changeover Switch

Ten parallel resonant circuits

11 damper circuits

12 resistance

13 capacitors

14 damper circuit switch

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[Translation done.]

## \* NOTICES \*

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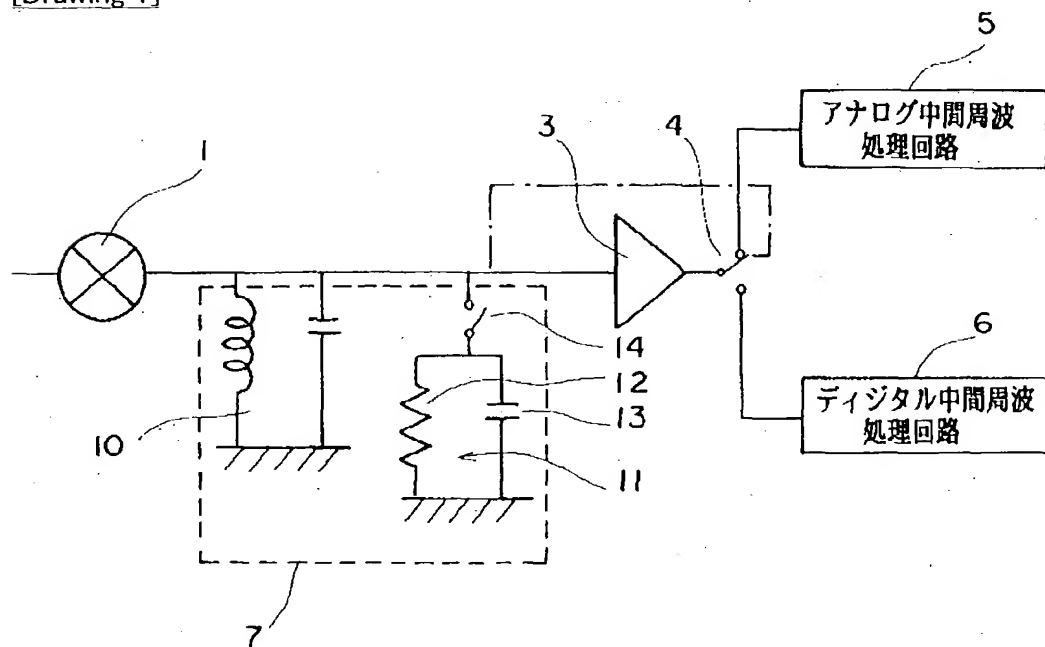
1. This document has been translated by computer. So the translation may not reflect the original precisely.

2. \*\*\*\* shows the word which can not be translated.

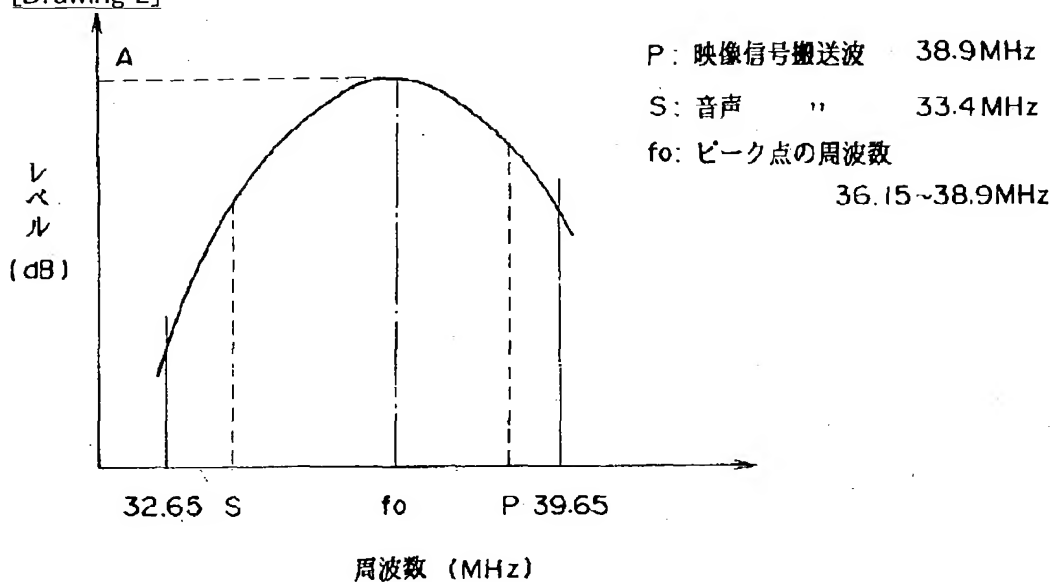
3. In the drawings, any words are not translated.

## DRAWINGS

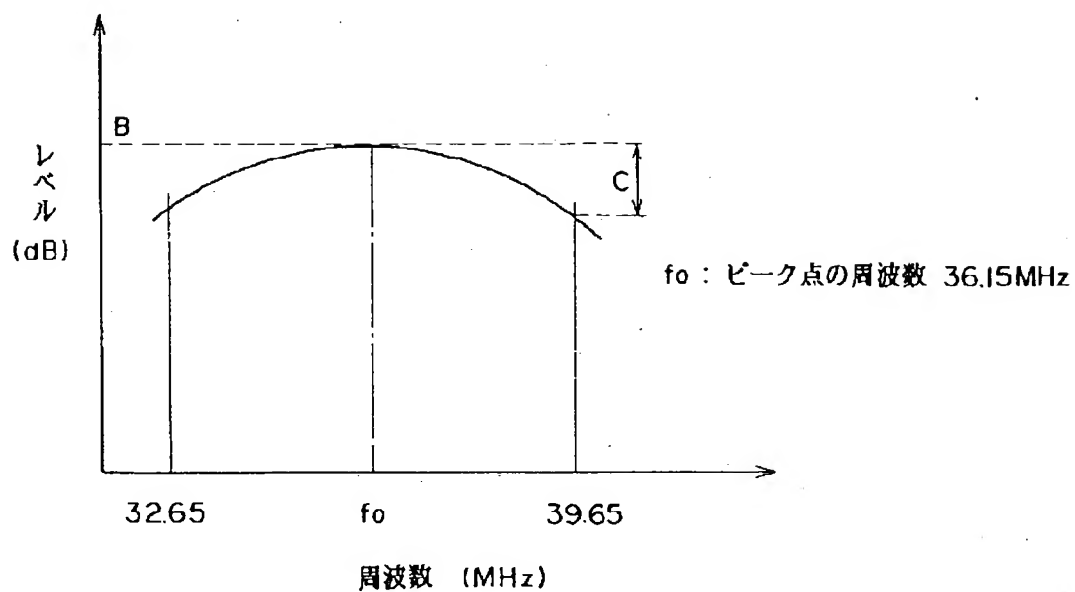
[Drawing 1]



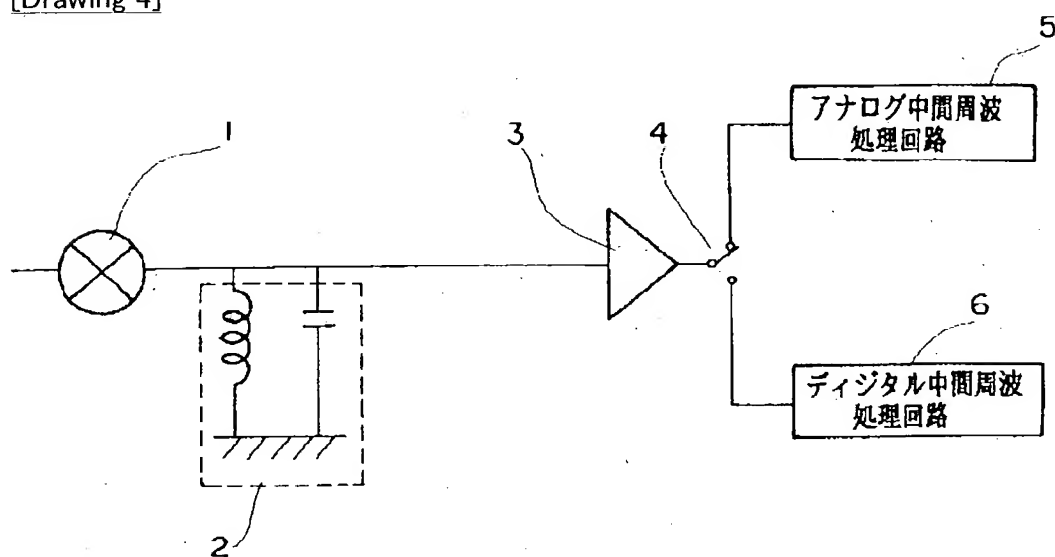
[Drawing 2]



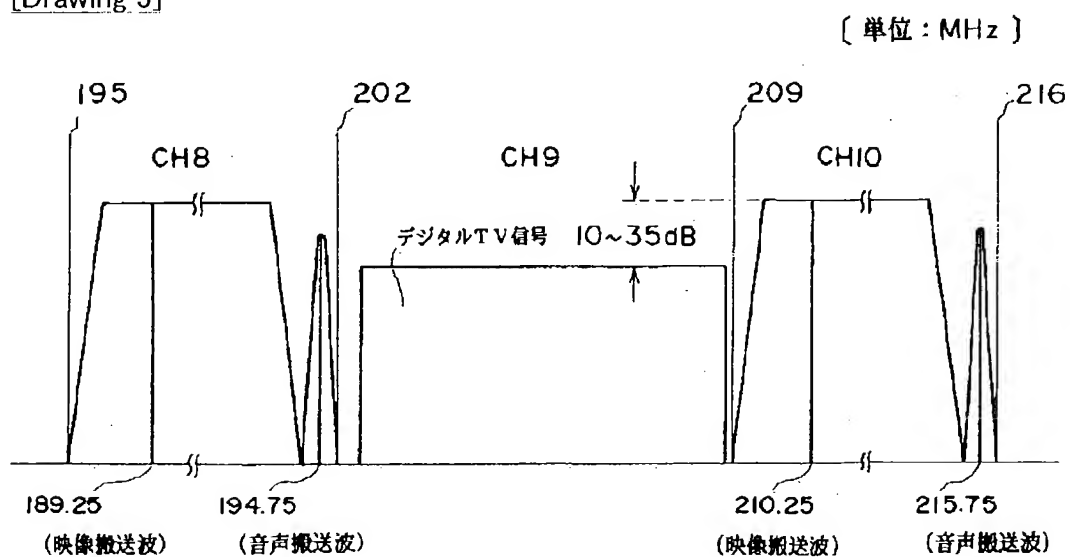
[Drawing 3]



[Drawing 4]



[Drawing 5]



[Translation done.]



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CORRECTION or AMENDMENT

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[Official Gazette Type] Printing of the amendment by the convention of 2 of Article 17 of patent law.

[Section partition] The 3rd partition of the 7th section.

[Date of issue] October 26, Heisei 13 (2001. 10.26)

[Publication No.] JP,2000-350107,A (P2000-350107A)

[Date of Publication] December 15, Heisei 12 (2000. 12.15)

[\*\*\*\* format] Open patent official report 12-3502.

[Filing Number] Japanese Patent Application No. 11-159301.

[The 7th edition of International Patent Classification]

H04N 5/44

H03H 7/12

H03J 3/20

H04B 1/26

[FI]

H04N 5/44 K

L

H03H 7/12

H03J 3/20

H04B 1/26 H

[Procedure revision]

[Filing Date] January 16, Heisei 13 (2001. 1.16)

[Procedure amendment 1]

[Document to be Amended] Specification.

[Item(s) to be Amended] Claim.

[Method of Amendment] Change.

[Proposed Amendment]

[Claim(s)]

[Claim 1] It is the television tuner which is equipped with the mixer which changes the received analog television signal or a digital television signal into an intermediate frequency signal, and the intermediate frequency amplifier prepared in the latter part of the aforementioned mixer, prepares the tuning circuit which passes the aforementioned intermediate frequency signal between the aforementioned mixer and the aforementioned intermediate frequency amplifier, and is characterized by making Q of the aforementioned tuning circuit smaller than the time of analog television signal reception at the time of digital television signal reception.

[Claim 2] The aforementioned tuning circuit is a television tuner according to claim 1 characterized by consisting of a parallel resonant circuit and a damper circuit, making the aforementioned damper circuit attach and detach to the aforementioned parallel resonant circuit,

and changing Q.

[Claim 3] The television tuner according to claim 2 to which the aforementioned damper circuit is characterized by the bird clapper from the parallel circuit of resistance and a capacitor.

[Claim 4] the time of analog television signal reception -- the television tuner according to claim 3 characterized [ the frequency of the peak point of the alignment property of the aforementioned tuning circuit ] for the frequency of the peak point of the alignment property of the aforementioned tuning circuit by the thing of an intermediate frequency band mostly considered as main frequency as frequency higher than the center of an intermediate frequency band at the time of digital television signal reception

[Procedure amendment 2]

[Document to be Amended] Specification.

[Item(s) to be Amended] 0010.

[Method of Amendment] Change.

[Proposed Amendment]

[0010] Moreover, the television tuner of this invention is a television tuner according to claim 2 to which the aforementioned damper circuit is characterized by the bird clapper from the parallel circuit of resistance and a capacitor. Moreover, the television tuner of this invention is a television tuner according to claim 3 characterized [ the frequency of the peak point of the alignment property of the aforementioned tuning circuit ] for the frequency of the peak point of the alignment property of the aforementioned tuning circuit by the thing of an intermediate frequency band mostly considered as main frequency as frequency higher than the center of an intermediate frequency band at the time of digital television signal reception at the time of analog television signal reception.

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[Translation done.]